

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 5 | Technical Appendices

CFA11 | Stoke Mandeville and Aylesbury  
**Baseline report (EC-010-002)**  
Ecology

November 2013

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Department  
for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

A report prepared for High Speed Two (HS2) Limited.

High Speed Two (HS2) Limited,  
Eland House,  
Bressenden Place,  
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

Website: [www.hs2.org.uk](http://www.hs2.org.uk)

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# **Volume 5: Baseline Report - EC-010-002**

## **HRA screening for the Chilterns Beechwoods SAC**

# 1 HRA Screening Report for Chilterns Beechwoods SAC

## 1.1 Introduction

- 1.1.1 Construction of Phase One of the proposed High Speed 2 railway is due to commence in 2017. During construction, some roads local to the construction site will receive increased use from construction workers, delivery vehicles and heavy goods vehicles. In the Stoke Mandeville and Aylesbury area (CFA11) there is potential for traffic, which will use the A4010 to service the construction phase of the Proposed Scheme, to impact on a component of a site known as the Chilterns Beechwoods. This site is designated as a Special Area of Conservation (SAC) under European Council Directive on the Conservation of natural habitats and of wild flora and fauna (92/43/EEC) [the Habitats Directive].
- 1.1.2 The Habitats Directive is enacted in England through The Conservation of Habitats and Species Regulations 2010 (as amended)<sup>1</sup>. The Regulations require the competent authority to assess the effects of development on European sites (Natura 2000 sites) and to determine whether the development will result in a likely significant effect on any of them, either alone or in-combination with other projects and plans. Where a likely significant effect is concluded, or where it is not possible to reach a conclusion of no likely significant effect, the competent authority must then undertake an appropriate assessment, to determine whether the plan or project will result in an adverse effect on the integrity of any Natura 2000 site. Where an appropriate assessment has been carried out and results in a negative assessment (in other words, any proposed avoidance or mitigation measures are unable to reduce the potential effect so that it is no longer significant) or if uncertainty remains over the significant effect, consent will only be granted if there are no alternative solutions, and there are imperative reasons of over-riding public interest for the development and compensatory measures have been secured.
- 1.1.3 A Habitats Regulation Assessment (HRA) is a staged process of which an appropriate assessment is one discrete stage.

## 1.2 Screening Method

### Summary of HRA process

- 1.2.1 The process generally known as Habitats Regulation Assessment utilises a stage by stage approach as follows:
- Stage 1 – screening;
  - Stage 2 – appropriate assessment;

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<sup>1</sup> The Conservation of Habitats and Species Regulations 2010 (as amended) implement Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. The aim of the Habitats Directive is to conserve natural habitats and wild species across Europe by establishing a network of sites known as Natura 2000 (also known as European sites).

- Stage 3 – assessment of alternative solutions; and
  - Stage 4 – assessment where no alternative solutions exist and where adverse impacts remain (i.e. an assessment of whether the development is necessary for imperative reasons of overriding public interest and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network).
- 1.2.2 This report focuses on Stage 1 in order to determine whether or not the Proposed Scheme through the Chilterns in Buckinghamshire will have a likely significant effect upon the Chilterns Beechwoods SAC. It also identifies any areas of uncertainty, based on the precautionary principle, which may require further investigation in order to inform the overall Habitats Regulation Assessment.
- 1.2.3 Determination of no significant effect upon this site requires satisfying the following criteria:
- that the area of Annex 1 habitats (or composite features) will not be reduced;
  - that there will be no changes to the composition of the habitats for which the site was designated (e.g. reduction in species structure, abundance or diversity that comprises the habitat over time);
  - that there will be no direct effect on the population of species for which this site was designated or classified;
  - that there will be no indirect effects on the population of species for which the site was designated or classified due to loss or degradation of their habitat (quantity and/or quality); and
  - that there will be no interruption or degradation of the physical, chemical or biological processes that support habitats and species for which the site was designated or classified.
- 1.2.4 The screening stage will have one of the following three outcomes:
- no likely significant effect;
  - a likely significant effect; or
  - it cannot be concluded that there will be no likely significant effect.
- 1.2.5 If the assessment concludes outcomes two or three, then the need for an appropriate assessment will be triggered.
- 1.2.6 'Likely significant effect' in this context is any effect that may reasonably be predicted as a consequence of the project and that may significantly affect the conservation or management objectives of the features for which a site was designated<sup>2</sup>.

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<sup>2</sup> Habitats Regulations Guidance Note 3. The Determination of Likely Significant Effect under The Conservation (Natural Habitats &c) Regulations 1994. English Nature, 1999.

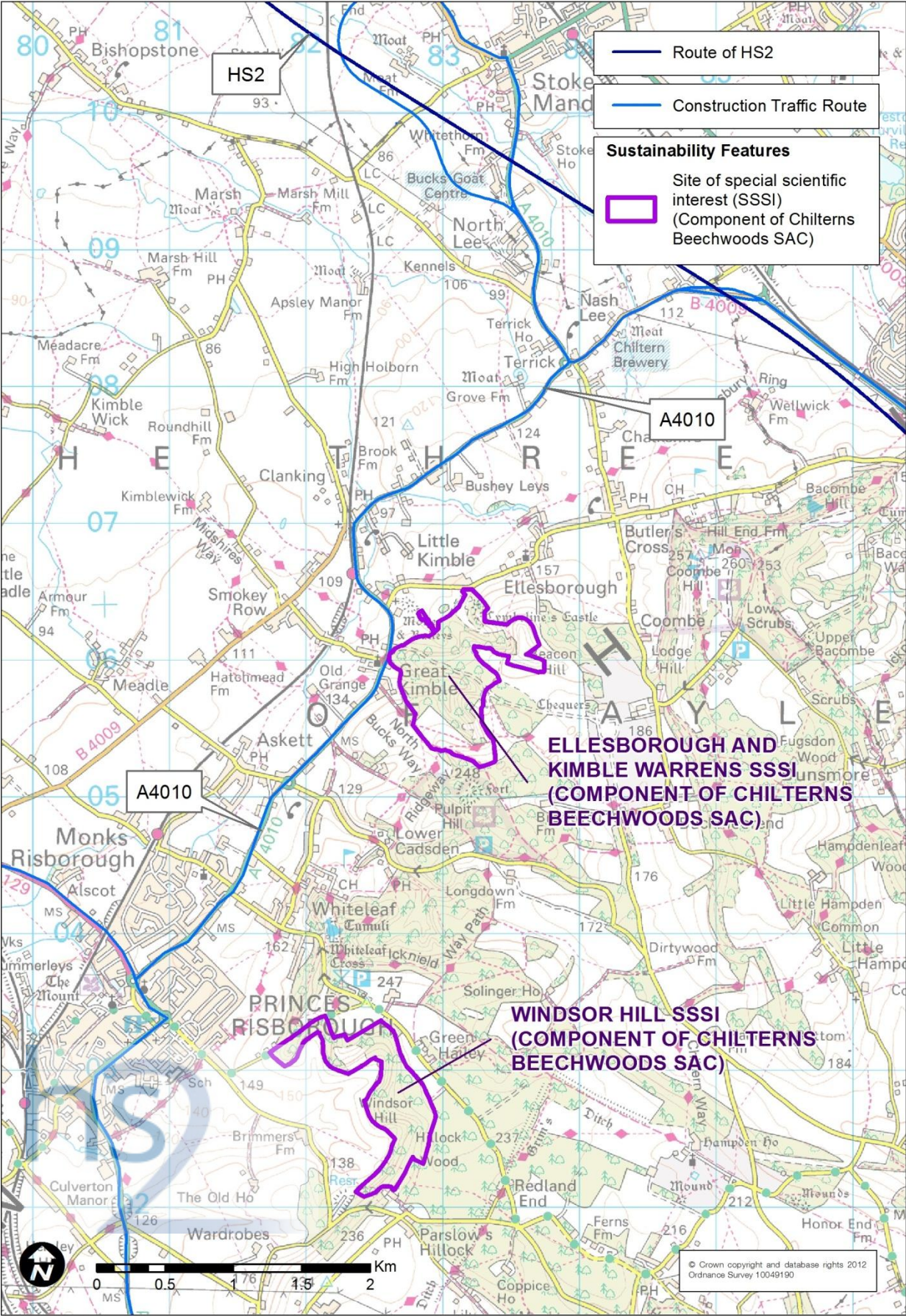
- 1.2.7 A judgement as to the significance of an effect must take into account factors such as temporal considerations (e.g. length of time of effect) and physical considerations (e.g. extent of effect on the European site and the elements of the site including its conservation objectives). It is possible, therefore, for an effect to damage something on the European site, but because such damage is fleeting, limited in extent or damaging to something outwith any conservation objectives, the effect is insignificant in this context. The judgement should take into account the likely effects once avoidance measures (but not any compensation measures) have been applied.
- 1.2.8 This report uses a screening matrix to undertake the screening exercise, as provided in Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites (European Commission, 2002).

### Consultations

- 1.2.9 Consultations with Natural England (NE), as the Government's statutory advisors on nature conservation including HRA, are an important part of the process. HS2 Ltd has undertaken regular consultations with NE and continues to do so.



Figure 1: Proximity of Chilterns Beechwoods SAC to the A4010 and HS2 route



## 1.3 Screening Matrix

1.3.1 Table 1 shows the screening matrix used to undertake the screening exercise.

Table 1: Screening Matrix

<b>PROJECT NAME: HS2</b>
<b>PLANNING APPLICATION DETAILS: Parliamentary Hybrid Bill</b>
<b>CHARACTERISTICS OF NATURA 2000 SITE UNDER CONSIDERATION</b>
<b>Name of European Site</b> Chilterns Beechwoods Special Area of Conservation (SAC)
<b>Location and distance of the European Site from the proposed works</b> The SAC comprises nine separate blocks of woodland, which are located throughout the Chilterns. One of these blocks, Ellesborough and Kimble Warrens Site of Special Scientific Interest (SSSI), which is centred on OS Grid Reference SP826060, is the nearest to the route of the Proposed Scheme lying 2.5km to the south-west. The western tip of this SSSI, a 50m long section of woodland, comprises habitats as described for the SAC and is immediately adjacent to the A4010 Aylesbury Road/Risborough Road, which will be used by construction traffic. The woodland here comprises mainly beech and ash with occasional oak, an understorey of dense box, and ground flora with ancient woodland indicator species including spurge laurel, dog's-mercury and enchanter's nightshade.
<b>European Site size</b> The SAC is 1,277ha in area.
<b>Key features of the European Site including the primary reasons for selection and any other qualifying interests</b> The site's primary reason for selection is the Habitats Regulations Annex I habitat: <i>Asperulo-Fagetum</i> beech forests. The Chilterns Beechwoods SAC represents a very extensive tract of <i>Asperulo-Fagetum</i> beech forests in the centre of the habitat's United Kingdom (UK) range and is considered to be one of the best areas in the UK. The woodland is an important part of a grassland-scrub-woodland mosaic. A distinctive feature in the woodland flora is the occurrence of the rare coralroot.  Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) are also qualifying habitats (and important sites for orchid) although not the primary reason for the site's selection as an SAC.  Stag beetle is a qualifying species but not a primary reason for site selection.
<b>Vulnerability of the European Site</b> The principal vulnerability, as cited on the Natura 2000 Standard Data Form, relates to the uniform age of the beech woodland component of the SAC and in particular the long-term decline in structural and species diversity of its characteristic communities. In addition, the long-term sustainability of the juniper population is uncertain due to the lack of natural regeneration and a poor ability to compete with other scrub species.
<b>European Site conservation objectives</b> Not available
<b>DESCRIPTION OF PROJECT:</b> <b>Location</b> Phase One of High Speed Two (HS2) links London with Birmingham. At Hyde Heath, approximately 11km to the south-east of the Ellesborough and Kimble Warrens SSSI component of the Chilterns Beechwoods SAC, it emerges from a bored tunnel and skirts to the west of Wendover. It continues in a north-westerly direction passing Stoke Mandeville and Aylesbury to the west. This component of the SAC is located near the village of Great Kimble to the north of Princes Risborough, Buckinghamshire.



<p><b>Size and scale</b></p> <p>HS2 is a new high speed railway proposed by the Government to connect major cities in Britain. Stations in London, Birmingham, Leeds, Manchester, South Yorkshire and the East Midlands will be served by high speed trains running at speeds of up to 360kph (225mph).</p> <p>HS2 is proposed to be built in two phases. Phase One will involve the construction of a new railway line of approximately 230km (143 miles) between London and Birmingham. Construction will begin in 2017 and the line will become operational by 2026; with a connection to the West Coast Main Line (WCML) near Lichfield and to the existing HS1 railway line in London.</p> <p>On opening, Phase One will run up to 14 trains per hour in each direction during peak hours.</p>
<p><b>Land-take</b></p> <p>No land-take within the SAC boundary will occur.</p>
<p><b>Distance from the European Site or key features of the site (from edge of the proposed development)</b></p> <p>Land required for the construction of the Proposed Scheme is approximately 2.5km to the north-east of the nearest point of the SAC, where the route runs to the west of Wendover and parallel to the A413.</p> <p>The western tip of a block of woodland that forms Ellesborough and Kimble Warrens SSSI, a component part of the SAC, is adjacent to the A4010 Aylesbury Road/Risborough Road, which will be used by construction traffic for the Proposed Scheme.</p> <p>The estimated duration of vehicle movement associated with the construction phase will be less than four years. Overall there is predicted to be a small increase in overall traffic movements as a result of the Proposed Scheme; however, as a proportion the majority of the increase is heavy goods vehicles.</p>
<p><b>RESOURCE REQUIREMENTS</b></p> <p>None</p>
<p><b>Emissions</b></p> <p>Due to the distance of the SAC from the Proposed Scheme, and the implementation of the Code of Construction Practice (CoCP) (see Volume 5: Appendix CT-003-000), no direct impacts from pollutants are anticipated from the construction site of the Proposed Scheme.</p> <p>During the construction phase, works traffic will use the A4010 Aylesbury Road/Risborough Road to reach the Proposed Scheme. This will result in changes to air quality from: airborne (exhaust) pollutants (NOx) and nitrogen deposition (eutrophication) on adjacent habitats.</p> <p>In order to assess the impact of these pollutants on the qualifying features of the SAC, and to assist in determining whether or not there is a likely significant effect on the SAC, atmospheric dispersion modelling ADMS-Roads was undertaken. Details are provided in the air quality report (Volume 5: Appendix AQ-001-011). Values for the critical level (NOx) and critical load (nutrient deposition) and baseline rates for the main habitats within the SAC were taken from the Air Pollution Information System website (apis.ac.uk).</p> <p>Environment Agency guidance<sup>3</sup>, to which Natural England also subscribes, advises that 'where the concentration within the emission footprint (that is, the contribution of the project/plan in question) in any part of the European site(s) is less than 1% of the</p>

<sup>3</sup> Environment Agency (2007), Appendix ASC 1 Environment Agency Stage 1 and 2 Assessment of New PIR Permissions under the Habitats Regulations.

relevant long-term benchmark (critical level or critical load), the emission is not likely to have a significant effect on the vegetation alone or in combination irrespective of the background levels'. However, this does not mean that an increase in deposition rate (also termed the Process Contribution) equivalent to more than 1% of the critical level/load will lead to an adverse effect on vegetation, but rather that further consideration may be required<sup>4</sup>.

This further consideration utilises a second test, which is to assess the predicted environmental contribution. This is calculated by adding the predicted Process Contribution to the appropriate background concentration. Where the predicted environmental contribution is less than 70% of the relevant critical level the pollutant is not likely to have a significant effect on the vegetation<sup>5</sup>.

The model used included transects at increasing distances away from the roadside. The following figures relate to levels of pollutants at 20m and 50m from the A4010. Habitats within 20m of the A4010 represent approximately 0.12ha (0.009%) and within 50m 0.5ha (0.039%) of the SAC. Further details are provided in Appendix AQ-001-011.

The predicted nitrogen deposition rate and NO<sub>x</sub> concentrations were calculated for the commencement of construction in 2017 with and without the Proposed Scheme.

#### **NO<sub>x</sub> concentrations**

At 20m from the A4010 the existing concentration of NO<sub>x</sub>, based on 2012 baseline data, is 22.7µg/m<sup>3</sup>. The predicted concentration of NO<sub>x</sub> in 2017 without the Proposed Scheme is 18.6µg/m<sup>3</sup>, rising to 19.1µg/m<sup>3</sup> with the Proposed Scheme as a result of the associated increase in construction traffic. The critical level, beyond which adverse effects on receptors may occur, is nationally set at an annual mean of 30µg/m<sup>3</sup> and is not habitat specific. Increased construction traffic is predicted to result in a change in NO<sub>x</sub> concentration of 1.8% of critical level and a total NO<sub>x</sub> concentration of 63.8% of critical level (see Appendix AQ-001-011: Table 14).

The change in NO<sub>x</sub> concentration exceeds 1% of the critical level but only within less than 0.01% of the SAC, and only marginally (1.8% of the critical level). This is a small increase (only just over the threshold below which it could be considered trivial)<sup>6</sup>. The change in air quality will be for a period of less than four years and will be a reversible impact. When the second test is applied it is clear that the predicted environmental contribution is less than the critical level, and therefore it is confirmed that there will be no impact on vegetation and no likely significant effect on the SAC as a consequence of the predicted change in NO<sub>x</sub> concentration at 20m from the road.

Beyond 20m the changes in NO<sub>x</sub> concentrations as % of critical level diminish rapidly, dropping to less than 1% at 50m. Thus, somewhere between 20m and 50m from the road the potential impact on vegetation falls below the 1% level, which even without applying the predicted environmental contribution test, is the point beyond which there is no significant effect on vegetation.

It is clear that there is no significant impact on vegetation at 20m or beyond

It should be noted that even with the Proposed Scheme the NO<sub>x</sub> concentrations will be less in 2017 than they were in 2012<sup>7</sup>.

#### **Eutrophication (nitrogen deposition)**

The predicted contribution of the increased traffic movements to the nitrogen deposition rate was compared to 1% of the critical load. The Site-Relevant Critical Load function on the UK Air Pollution Information System identifies that the appropriate minimum rate of nitrogen deposition to utilise as the 'critical load' for the *Asperulo-Fagetum* beech forest is 10-20 kg N/ha/yr.

The existing nitrogen deposition rate at 20m from the A4010 is 50.7kg N/ha/year, which already exceeds the critical load range of

<sup>4</sup> Critical Loads are defined as: "a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge" Critical loads are assigned to habitat classes of the European Nature Information System to enable consistency of habitat terminology and understanding across Europe. Critical loads are given as ranges (e.g. 10-20 kgN/ha/yr). [http://www.apis.ac.uk/overview/issues/overview\\_Cloadslevels.htm](http://www.apis.ac.uk/overview/issues/overview_Cloadslevels.htm). Critical levels are defined as "concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge". Critical Levels are not habitat specific, as in critical loads, but have been set to cover broad vegetation types (e.g. forest arable, semi-natural), often with critical values set for sensitive lichens and bryophytes. [http://www.apis.ac.uk/overview/issues/overview\\_Cloadslevels.htm](http://www.apis.ac.uk/overview/issues/overview_Cloadslevels.htm)

<sup>5</sup> Environment Agency (2007), Appendix ASC 1 Environment Agency Stage 1 and 2 Assessment of New PIR Permissions under the Habitats Regulations.

<sup>6</sup> The Design Manual for Roads and Bridges defines a 'small' increase as being one which will result in an increase in NO<sub>x</sub> concentrations equivalent to 5% of the critical level or less.

<sup>7</sup> Deposition of reduced and oxidised nitrogen is expected to decrease on average across Britain by 1.5% and 2.6% per annum respectively due to increasingly stringent emission limits. (DMRB Vol 11 Part 1)

<p>10-20kg N/ha/year. This is predicted to rise to 51.4kg N/ha/year in 2017 without the Proposed Scheme, and 51.5kg N/ha/year with the Proposed Scheme. This signifies a change in deposition as a result of the Proposed Scheme of 0.4-0.8% of the critical load.</p> <p>Thus, the change in nitrogen deposition rates attributable to the Proposed Scheme does not exceed 1% of the critical load.</p> <p>Again the change in air quality as a result of an increase in construction traffic is small, restricted to a very small area of the SAC and is only a temporary effect lasting less than four years.</p> <p>Beyond 20m the changes in nitrogen deposition as % of critical level diminish rapidly, dropping to 0.2-0.4% of critical load at 50m and 0.1-0.2% at 100m.</p> <p>Following Environment Agency guidance, it can therefore be concluded that the contribution of additional traffic arising from the construction of the Proposed Scheme would be sufficiently low that there would be no likely significant effect on the SAC.</p> <p>Traffic pollution from the A4010 has had an effect on the adjacent areas of the Chilterns Beechwoods SAC over a number of decades, and changes, for example to more sensitive species such as lower plants, will already have taken place. Hence the temporary minor increase in air pollutants as a result of HS2 traffic would not lead to any further change. At most there may be some slight delay in recovery of such species.</p>
<p><b>Excavation requirements</b></p> <p>There are no hydrological connections linking the Proposed Scheme with the SAC.</p>
<p><b>Transportation requirements</b></p> <p>None</p>
<p><b>Duration of construction, operation, etc.</b></p> <p>Works are due to start in 2017, continuing until 2021.</p>
<p><b>Other</b></p> <p>No other effects are anticipated.</p>
<p><b>DESCRIPTION OF AVOIDANCE AND/OR MITIGATION MEASURES</b></p>
<p><b>Nature of proposals</b></p> <p>None required</p>
<p><b>Location</b></p> <p>None required</p>
<p><b>Evidence for effectiveness</b></p> <p>None required</p>
<p><b>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</b></p> <p>None required</p>
<p><b>ASSESSMENT CRITERIA</b></p>
<p>Other than those described above, no other impacts on the SAC resulting from the construction and operation of the Proposed Scheme are likely.</p>
<p><b>INITIAL ASSESSMENT</b></p> <p>The following describe any likely changes to the site arising as a result of:</p>
<p><b>Reduction of habitat area</b></p> <p>There will no land-take within the SAC boundary as a result of development proposals.</p>
<p><b>Disturbance to key species</b></p> <p>N/A</p>
<p><b>Habitat or species fragmentation</b></p> <p>N/A</p>
<p><b>Reduction in species density</b></p>

N/A
<b>Changes in key indicators of conservation value (water quality, etc.)</b> N/A
<b>Climate change</b> Unknown
The following describe any likely impacts on the European Site as a whole in terms of:
<b>Interference with the key relationships that define the structure of the site</b> N/A
<b>Interference with key relationships that define the function of the site</b> N/A
The following indicate the significance as a result of the identification of impacts set out above in terms of:
<b>Reduction of habitat area</b> None
<b>Disturbance to key species</b> None
<b>Habitat or species fragmentation</b> None
<b>Loss</b> None
<b>Fragmentation</b> None
<b>Disruption</b> None
<b>Disturbance</b> None
<b>Change to key elements of the site (e.g. water quality, hydrological regime etc.)</b> None
No further information is necessary to inform assessment of impacts upon this site.
<p>Outcome of screening stage</p> <p>No likely significant effect on the integrity or qualifying features of the SAC will occur as a result of the development.</p> <p>At a distance of 20m from the A4010, the existing NO<sub>x</sub> concentration is predicted to increase by 1.8% of the critical level and the predicted environmental contribution will remain below 70% of the critical level. Together, these two tests confirm that there will be no significant effect on vegetation. At the same distance the nitrogen deposition will increase only by 0.4-0.8% of the critical load, which is again not significant. At 50m from the road the increase in NO<sub>x</sub> concentration drops below 1% and the nitrogen deposition rate reduces to 0.2-0.4% of critical load.</p> <p>This predicted change in air quality will apply to an area of less than 0.009% of the SAC at 20m. The change will be for a period of less than four years and will be a reversible impact. In addition, for both NO<sub>x</sub> and nitrogen deposition the 2017 figures with the Proposed Scheme vary little from the 2012 baseline, and in the case of NO<sub>x</sub> levels are actually lower. The impact of road pollution is likely to have had an impact on the SAC over a number of years and almost certainly prior to its designation. The temporary minor increase in air pollutants as a result of HS2 traffic is unlikely to lead to any further change that is significant.</p> <p>It is considered that the data presented here provide sufficient evidence of no likely significant effect and that no further analysis</p>

would lead to a different conclusion.

1.3.2 Table 2 and Table 3 provide the results for NO<sub>x</sub> and nitrogen deposition at the Chilterns Beechwoods SAC.

Table 2: Critical level - NO<sub>x</sub> assessment

	NO <sub>x</sub> concentrations (µg/m <sup>3</sup> )							
Receptor	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme	Change in concentrations (µg/m <sup>3</sup> )	Critical level (µg/m <sup>3</sup> ) (annual mean)	Change in concentrations as % of critical level	Total NO <sub>x</sub> as a % of critical level	Potentially significant impact on vegetation? (change in concentration greater than 1% and total NO <sub>x</sub> greater than 70%)
11-33 (10m)	26.3	21.5	22.4	0.9	30	2.9	74.6	Yes
11-33 (20m)	22.7	18.6	19.1	0.5	30	1.8	63.8	No
11-33 (50m)	19.6	16	16.3	0.3	30	0.9	54.4	No

Table 3: Critical load - nutrient nitrogen deposition

	Nitrogen deposition rate (kg N/ha/year)							
Receptor	2012 baseline deposition	2017 without Proposed Scheme	2017 with Proposed Scheme	Change in deposition	Critical load range (kg N/ha/year)	Change in deposition as % of critical load	Total nitrogen deposition as a % of critical load	Potentially significant impact on vegetation? (change in concentration greater than 1% and total NO <sub>x</sub> greater than 70%)
11-33 (10m)	50.7	51.8	51.9	0.1	10-20	1.2 (low), 0.6 (high)	519 (low), 260 (high)	Yes
11-33 (20m)	50.7	51.4	51.5	0.1	10-20	0.8 (low), 0.4 (high)	515 (low), 257 (high)	No
11-33 (50m)	50.7	51	51.1	<0.1	10-20	0.4 (low), 0.2 (high)	511 (low), 255 (high)	No

## 1.4 References

Air Pollution Information System. Site relevant critical loads and source attributions: Chilterns Beechwoods SAC; <http://www.apis.ac.uk/src/>; Accessed 15 October 13.

European Commission. (2002). Assessment of plans and projects significantly affecting Natura 2000 sites. Office for Official Publications of the European Communities, Luxembourg; [http://www.ec.europa.eu/environment/nature/natura2000/management/guidance\\_en.htm](http://www.ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm); Accessed 15 October 10.

Highways Agency. (2007). Design Manual for Roads and Bridges. Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 1, Air Quality. Reference 207/07; <http://www.standardsforhighways.co.uk/dmr/vol11/section3/ha20707.pdf>; Accessed 17 October 13.